CULTIVATION OF SHRIMP IN ARTIFICIAL PONDS

This project was started in December 1964 to determine the feasibility of culturing shrimp commercially in ponds under seminatural conditions. More specifically, this research is designed to give information on the cost of pond construction and maintenance and provide data on environmental factors within the pond that may affect growth and survival rate of pond-held shrimp.

Procedures

A different rearing technique is being attempted in each of the two ponds (100 ft. by 50 ft. by 4 1/2 ft.). One pond (circulating-water pond) has a continuous exchange of water filtered through oyster shell, and the shrimp are fed daily with a prepared diet. In the other pond (static-water pond), we add water only to compensate for evaporation loss, and add commercial fertilizer to promote the growth of plankton for natural food for shrimp (fig. 8).

Stocking of the ponds with postlarval brown shrimp required 4 days and was completed April 1, 1965. Final production was tentatively estimated at 125 lb. (pounds) of 26- to 30-count shrimp per pond. Limited data on mortality of reared shrimp indicated that to attain this goal, an initial stocking of about 9,000 postlarval shrimp would be required in each pond. These postlarvae were collected as they migrated into the Galveston estuarine system and were "hand-picked" in an attempt to eliminate predators. Three wk. after stocking, we began sampling shrimp weekly to obtain information on their growth.

Water samples have also been collected periodically and analyzed for dissolved oxygen, pH, nitrite, nitrate, total and inorganic phosphate, and chlorophyll. In addition, we have measured salinity and temperature daily. Average weekly temperature and salinity values obtained during the first 11 wk. of the initial experiment are presented in table 2.

Preliminary Results

In the static-water pond a lush growth of plankton was obtained during the first 3 wk. after stocking. Plankton counts showed an increase in numbers of flagellates and dinoflagellates followed by an increase in rotifers. At the end of the 3-wk. period, we tried unsuccessfully to catch shrimp. When we drained the pond, we found no shrimp. The bottom of the pond had a smelly black layer. The shrimp mortality was probably caused by low oxygen content, which we attribute to the lush growth and death of plankton.

This pond, after being thoroughly flushed and refilled, was again stocked with about 6,000 postlarval brown shrimp on May 6. Water fertility was not adjusted, for we felt that residue from the fertilizer originally used might be ample to ensure adequate plankton growth. Data obtained on growth in length and weight of shrimp during the next 6 wk. supported this assumption. Growth in length averaged 1.5 mm. (0.06 in.) per day, and in weight 0.07 g. (0.0025 oz.) per day (fig. 9).

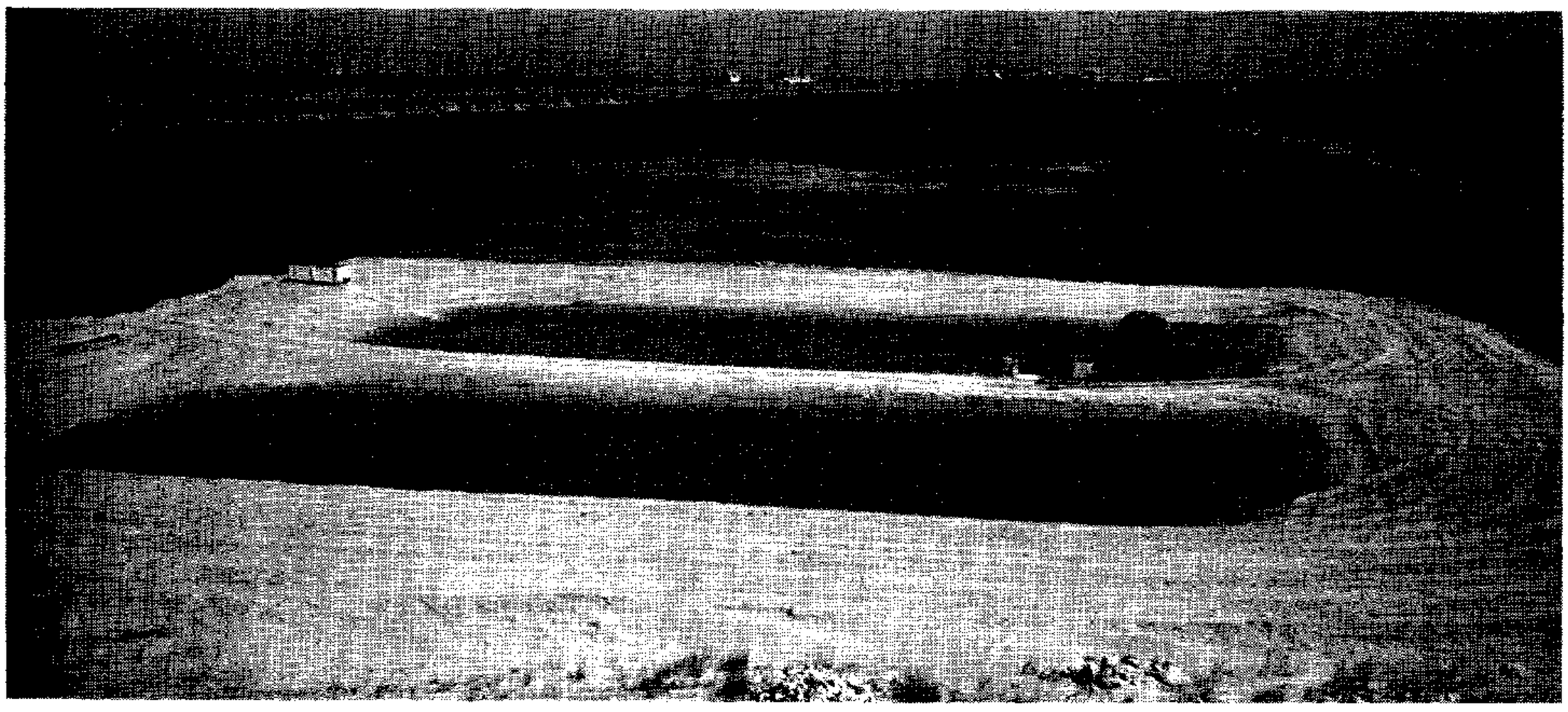

Figure 8.--Ponds dredged for cultivation of shrimp.

Table 2.--Average weekly temperatures and salinities

Week	Circulating-water pond			Static-water pond		
	Salinity	Bottom temperature		Salinity	Bottom temperature	
	P.p.t.	°C.	°F.	P.p.t.	°C.	°F.
1.....	25.6	20.0	68.0	27.4	21.0	69.8
2.....	18.1	23.0	73.4	23.8	25.0	77.0
3.....	24.4	24.5	76.1	28.0	24.0	75.2
4.....	23.6	24.5	76.1	28.0	24.0	75.2
5.....	25.3	23.5	74.3	(1)	(1)	(1)
6.....	25.4	25.5	74.3	27.0	27.0	80.6
7.....	(2)	26.5	79.7	24.5	27.0	80.6
8.....	(2)	27.0	80.6	23.5	26.0	78.8
9.....	17.8	28.0	82.4	22.5	28.0	82.4
10.....	20.8	28.5	83.3	24.2	28.5	83.3
11.....	18.5	31.0	87.8	21.7	31.5	88.7

[1] Flushing and cleaning of pond.
[2] No observation.

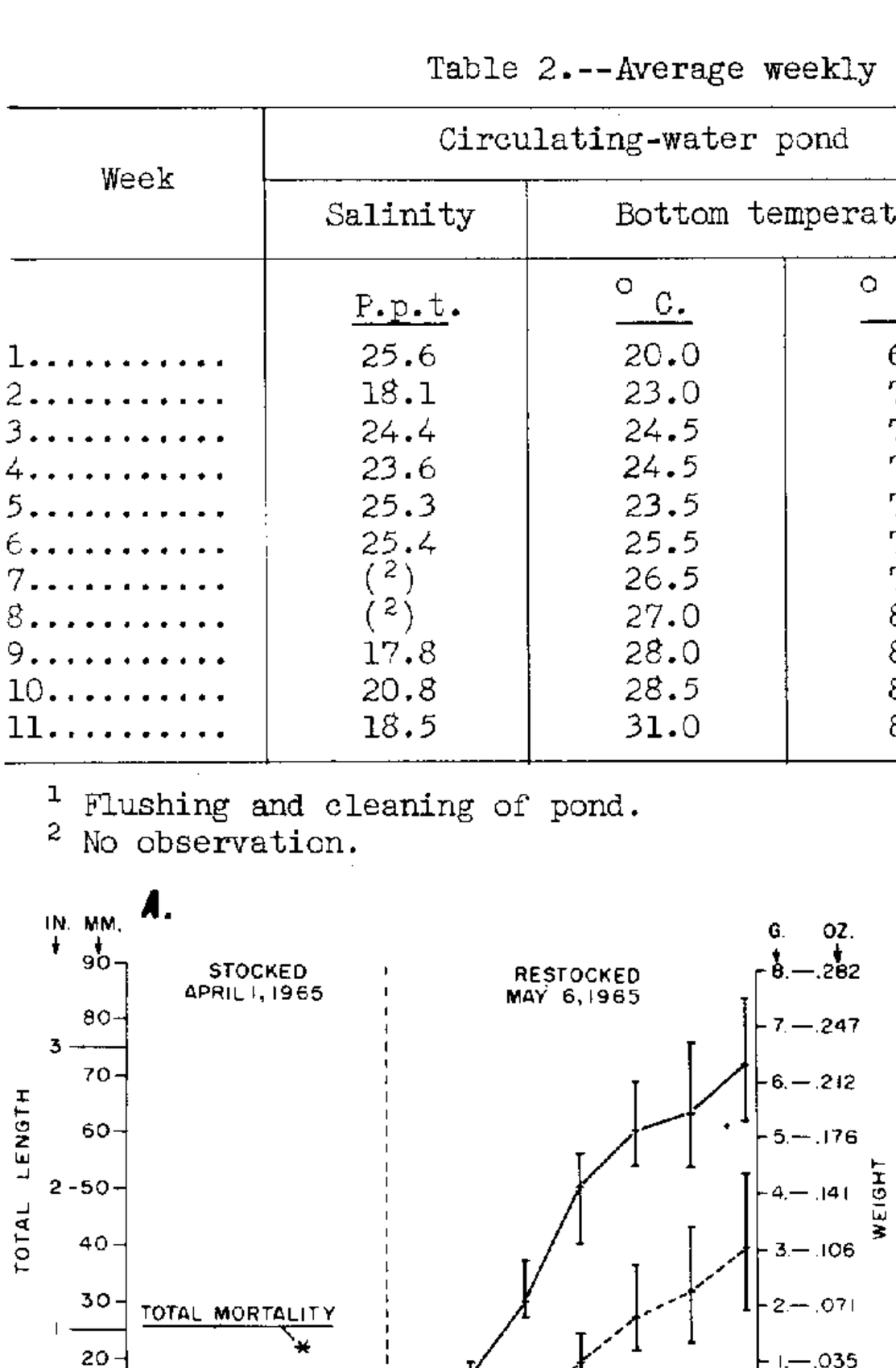

Figure 9.--Growth, measured in average lengths and weights, of brown shrimp reared in static-water pond (A) and circulating-water pond (B).

Results in the circulating-water pond appeared more promising because all the shrimp did not die. Average lengths and weights of shrimp during the first 77 days of this experiment increased at a rate of 0.9 mm. (0.035 in.) per day and 0.06 g. (0.0021 oz.) per day. Weekly variation in growth of length and weight may be due, in part, to the amount of food supplied daily.

Ray S. Wheeler, Project Leader

FLORIDA BAY ECOLOGY PROJECT

This project, started in fiscal year 1964, has two principal objectives: (1) to establish, by quantitative sampling, an index of abundance of juvenile pink shrimp in eastern Florida Bay and (2) to describe the habitat types in the pink shrimp nursery areas of eastern Florida Bay and relate these types to the density of juvenile pink shrimp in each area.

The Study Area

Florida Bay, located at the southern tip of the Florida Peninsula, is an extensive shallow embayment intersected by grass-covered mud banks and mangrove keys. Turney (1958)[9] separated the bay into four subenvironments based upon degree of water circulation, influx of ocean and fresh water, salinity and temperature ranges, and distribution of mollusks. For comparative purposes, we have located sampling sites in two of these subenvironments, and we are considering a third site (fig. 10).

Development of Sampling Equipment

Because we had to measure quantitatively the abundance of juvenile pink shrimp in Florida Bay, we considered several types of

[9] Turney, W. J. 1958. Molluscan distribution in Florida Bay. Shell EPR Rep. 513, 39 p.